

REMARKS

Claims 9-41 and 47-69 are pending in the application. Applicant expresses appreciation for the indication that claims 19, 20, 23, 24, 34, 36, 49, 51, 60, and 61 set forth allowable subject matter.

Claims 52, 53, 55-57, and 59 were previously withdrawn by the Examiner as allegedly being directed to a species other than the elected species. In the December 16, 2003 Office Action, the Office defines the elected species as "the first species directed to a method of manufacturing a semiconductor device including non selectively forming a monolayer of a deposition layer via a nucleation layer on two surfaces even though the first and second surfaces of the substrate exhibit a property of the deposition layer forming less readily on the first surface compared to the second surface." In the Response to April 20, 2004 Office Action, Applicant previously asserted at least on page 13, line 5 to page 14, line 7 that the withdrawn claims read upon the first species. Page 5 of the present Office Action briefly responds to Applicant's prior assertions, but does not address Applicant's prior assertion that the withdrawn claims read upon the first species.

MPEP 806.04(f) states that "claims to be restricted to different species must be mutually exclusive." (Emphasis added.) However, with regard to the elected first species, the withdrawn claims are not mutually exclusive of the claims currently under consideration. No limitations exist in the withdrawn claims that preclude such claims from reading upon the first species. Since the withdrawn claims clearly read upon the first species, such claims are entitled to consideration and are not presently under consideration by the Office. Applicant requests consideration of claims 52, 53, 55-57,

and 59 in the next Office Action. Such claims are discussed below as patentable over the currently cited art.

Claims 9-18, 21, 22, 25-33, 35, 37-41, 47, 48, 50, 54, 58, 62, 63-69 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Zenke in view of Nogami and Bohling. Applicant requests reconsideration.

Claim 9 sets forth a low selectivity deposition method that includes, among other features, forming a first part of a nucleation layer on a first surface of a substrate, forming a second part of a nucleation layer on a second surface of the substrate, and forming a deposition layer containing a chemisorbed first specie layer about one monolayer thick on the first and second parts of the nucleation layer. The deposition layer is formed substantially non-selectively even though the first and second surfaces of the substrate exhibit a property of the deposition layer forming less readily on the first surface compared to the second surface. Pages 3-4 of the Office Action allege that Zenke discloses every limitation of claim 9 except for forming the deposition layer to contain a chemisorbed first specie layer and relies upon Nogami as allegedly disclosing an ALD process suitable to form the claimed deposition layer. Applicant traverses.

Pages 3-4 of the Office Action allege that the motivation for modifying Zenke to substitute the LP-CVD discussed in column 5, lines 44-61 of Zenke with the ALD of Nogami is that the Nogami ALD constitutes an art recognized alternative method suitable to fulfill the purpose intended for the Zenke LP-CVD. However, regardless of whether the Nogami ALD is an art recognized alternative to the Zenke LP-CVD, Applicant asserts that no motivation exists to modify Zenke in the manner alleged by the Office. Specifically, no motivation exists to form silicon nitride film 6 of Zenke by ALD on silicon nitride film 5 of Zenke.

As may be readily appreciated upon review of column 2, lines 23-31 and column 2, line 66 to column 3, line 12 of Zenke, the problem addressed by Zenke is unique to forming silicon nitride film 12 (or silicon nitride film 6) by LP-CVD. Because of growth thickness differences between portions of silicon nitride film 12 (or silicon nitride film 6) formed by LP-CVD on lower electrode 3 as compared to silicon oxide film 2, a constricted portion 17 forms, promoting breakdown failure. Further, the entire purpose of providing silicon nitride film 5 in the manner described in column 5, lines 44-61 of Zenke is to remedy the described problems of forming silicon nitride film 12 (or silicon nitride film 6) by LP-CVD, as stated in column 3, lines 47-53 and column 4, lines 37-43 of Zenke. That is, if silicon nitride film 12 (or silicon nitride film 6) is instead formed by some method other than LP-CVD, then the teaching of Zenke (and Nogami) is that the problems described in Zenke will no longer exist.

Thus, no motivation will exist to form silicon nitride film 5 beneath silicon nitride film 12 or 6 if silicon nitride film 12 or 6 is formed by ALD instead of LP-CVD. Rather, those of ordinary skill would assume from the teachings of Zenke (and Nogami) that silicon nitride film 12 or 6 could be formed by ALD without silicon nitride film 5 and still avoid the problems associated with LP-CVD of silicon nitride film 12 or 6. Applicant asserts that no motivation exists to form the Zenke silicon nitride film 6 by the Nogami ALD method over the Zenke silicon nitride film 5. The clear teaching by Zenke is that forming the Zenke silicon nitride film 6 by the Nogami ALD method will eliminate the problems associated with forming the Zenke silicon nitride film 6 by the Zenke LP-CVD. Accordingly, those of ordinary skill would form the Zenke silicon nitride film 6 by the Nogami ALD method directly on lower electrode 3 and silicon oxide film 2 without first forming the Zenke silicon nitride film 5. Those of ordinary skill would be motivated to

avoid formation of unnecessary layers (such as silicon nitride film 5) and would not form the obsolete silicon nitride film 5.

Applicant acknowledges that page 7, lines 4-20 and elsewhere throughout the present specification disclose that ALD can be complicated by thickness variations caused by changes in composition and/or surface properties of an underlying substrate.

However, only Applicant's own specification and not the prior art recognizes such disadvantage of ALD. Neither Zenke nor Nogami recognize such disadvantage of ALD.

Applicants acknowledge that judgments on obviousness may necessarily involve a reconstruction based in a sense on hindsight reasoning. However, such reconstruction can only take into account knowledge that was within the level of ordinary skill in the art at the time the claimed invention was made and cannot include knowledge gleaned only from Applicant's disclosure. In re McLaughlin, 443 F.2d 1392, 1395, 170 USPQ 209, 212 (CCPA 1971); MPEP 2145(X)(A).

Accordingly, only the Applicant's own specification, and not the cited art, recognizes that a nucleation layer as set forth in claim 9 may be advantageously formed beneath a deposition layer containing a chemisorbed first specie layer. As such, Applicant persists in the assertion that no motivation exists to form the Zenke silicon nitride film 6 by the Nogami ALD method on the Zenke silicon nitride film 5. The Nogami ALD method is not a method suitable for the intended purpose of forming the Zenke silicon nitride film 6 on the Zenke silicon nitride film 5 since using such method would produce an unnecessary layer (silicon nitride film 5), according to the express teachings of Zenke in view of Nogami. Only the Applicant's own specification recognizes the advantages of the claim 9 method and no motivation exists to modify

Zenke so as to suggest the claim 9 method. At least for such reasons, claim 9 is patentable over the cited combination of references.

Page 4 of the Office Action relies upon Bohling as allegedly disclosing the subject matter set forth in claim 11, depending from claim 9, that forming the first and the second part of the nucleation layer occurs by ALD. Essentially, the Office Action alleges it would be obvious to substitute forming the Zenke amorphous silicon film 4 by ALD instead of LP-CVD. However, regardless of whether or not Bohling supports such a modification, Bohling fails to remedy the deficiencies of Zenke and Nogami discussed above with regard to claim 9. At least for such additional reasons, claim 9 is patentable over Zenke in view of Nogami and Bohling.

Claims 10-18, 21, 22, 25-30, and 62-65 depend from claim 9 and are patentable at least for such reason as well as for the additional limitations of such claims not disclosed or suggested. For example, claims 62 and 63 set forth process conditions suitable for non-selective CVD and ALD, respectively. Pages 4-5 of the Office Action allege that such process conditions are obvious as merely determining optimum process conditions by routine experimentation. Applicant traverses.

A particular parameter must first be recognized in the art as a result-effective variable, i.e., a variable that achieves a recognized result, before the determination of the optimum or workable ranges of the variable may be characterized as capable of being accomplished by routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contactor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contactor ratio, and therefore the parameter optimized was not recognized in the art to be a result-effective variable.); MPEP

2144.05(II)(B). Only the Applicant's own specification, and not the cited art, recognizes that CVD or ALD can be optimized to become non-selective using the claimed process conditions. Since the art does not recognize the claimed parameters as variables effective to produce the result of non-selectivity, selection of the claimed process conditions cannot be considered obvious by routine experimentation. Accordingly, claims 62 and 63 are patentable.

Claim 31 sets forth a low selectivity deposition method that includes, among other features, simultaneously forming a first part of a nucleation layer on an insulative oxide material and a second part of the nucleation layer on a semiconductive material and contacting the nucleation layer with an initiation precursor. The method includes forming an initiation layer about one monolayer thick on the first and second parts of the nucleation layer substantially non-selectively. As may be appreciated from the above discussion regarding the deficiencies of Zenke in view of Nogami and Bohling as applied to claim 9, the cited combination fails to disclose or suggest every limitation of claim 31. Claims 32, 33, 35, 37-41, 66-68 depend from claim 31 and are patentable at least for such reason as well as for the additional limitations of such claims not disclosed or suggested. For example, as may be appreciated from the discussion above regarding the patentability of claims 62 and 63, claims 66 and 67 depending from claim 31 are patentable.

Claim 47 sets forth a low selectivity deposition method that includes, among other features, atomic layer depositing a nucleation substance chemisorbed on a first surface and a second surface of a substrate substantially non-selectively. As may be appreciated from the above discussion regarding the deficiencies of Zenke in view of Nogami and Bohling as applied to claim 9, the cited combination fails to disclose or

suggest every limitation of claim 47. Claims 48, 50, and 69 depend from claim 47 and are patentable at least for such reason as well as for the additional limitations of such claims not disclosed or suggested. For example, as may be appreciated from the above discussion regarding the patentability of claims 62 and 63, claim 69 is also patentable.

Claim 52 sets forth a low selectivity deposition method that includes, among other features, forming a first part of a nucleation layer on a first surface of a substrate, forming a second part of a nucleation layer on a second surface of the substrate, and forming a layer about one monolayer thick of a first chemisorbed precursor on the first and second parts of the nucleation layer substantially non-selectively. As may be appreciated from the above discussion regarding the deficiencies of Zenke in view of Nogami and Bohling as applied to claim 9, the cited combination fails to disclose or suggest every limitation of claim 52. Claims 53-55 depend from claim 52 and are patentable at least for such reason as well as for the additional limitations of such claims not disclosed or suggested.


Claim 56 sets forth a low selectivity deposition method that includes, among other features, forming a first part of a nucleation layer on a first surface of a substrate, forming a second part of a nucleation layer on a second surface of the substrate, and forming a layer of a first chemisorbed specie at least one monolayer thick on the first and second parts of the nucleation layer substantially non-selectively. As may be appreciated from the above discussion regarding the deficiencies of Zenke in view of Nogami and Bohling as applied to claim 9, the cited combination fails to disclose or suggest every limitation of claim 56. Claims 57-59 depend from claim 56 and are

patentable at least for such reason as well as for the additional limitations of such claims not disclosed or suggested.

Further, Applicant submitted a Supplemental Information Disclosure Statement and Form PTO-1449 of which it does not yet have an initialed copy from the Examiner. This Supplemental Information Disclosure Statement was initially submitted to the U.S. Patent and Trademark Office on July 17, 2003. To the extent the PTO-1449 has not already been initialed in the file, such examination and initialing is requested at this time, and returning a copy to the undersigned. Applicant herewith submits a correction of the July 20, 2004 Supplemental IDS addressing the errors listed on page 2 of the Office Action and requests consideration of the cited references.

Respectfully submitted,

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